Basin analysis of potentially gas-bearing Lower Carboniferous shales in the area of Fore-Sudetic Monocline

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Moravo-Silesian Basin belongs to foreland basins system of the Varican orogeny. Northern section of Moravo-Silesian Basin comprises Lower Carboniferous sediments which were analysed as potentially hydrocarbons bearing rocks.

The data used in the research had been collected during sedimentological profiling of five archival cores. Sediments of western part of investigated area were described as proximal flysch facies comprising sandstones, mudstones and some conglomerates. East-trending facies distalization was observed. Distal facies are represented by black shales intercalated with very fine-grained sandstones. In the south-eastern direction a transition of flysch facies into carbonate facies was observed.

The analysed sediments are arcosic wackes, arcosic-lithic wackes, silty mudstones and mudstones. Increasing mineral maturity in Lower Carboniferous sediments was discovered what is demonstrated by decreasing content of lithoclasts and increasing content of quartz and feldspar grains towards the top of the succession.

Lower Carboniferous flysch sediments are very organic-matter and pyrite rich. Scanning electron microscope analysis also revealed the presence of bastnasite what is the evidence that the rocks have not undergone high-temperature processes.

The values of TOC range from 0.7 to 1.65% and are sufficient for hydrocarbon generation. According to data from the southern edge of the study area vitrinite reflectance values reaches 2.26-4.59% (dry gas window to overmature stage). The organic matter of Lower Carboniferous flysch sediments contains gas-prone, type-III kerogen.

Optimal conditions for forming of unconventional hydrocarbons (shale gas) were stated in the area located between the Kraków-Lubliniec (Hamburg) fault zone (northern boundary) and parallel of latitude of Kędzierzyn-Koźle (southern boundary).

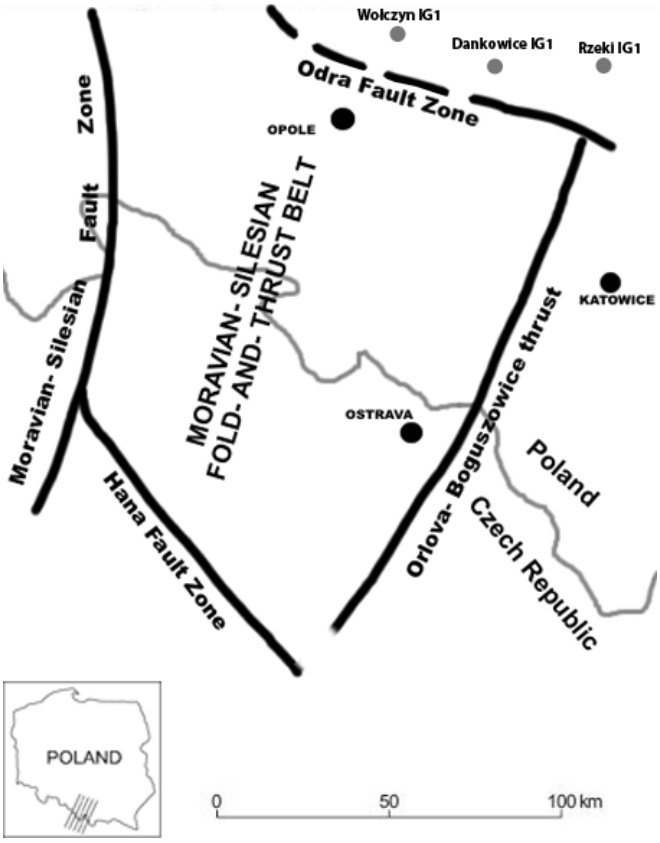

Fig. 1.: Structural elements of the Moravo-Silesian Basin (modified after Buła *et al.*, 2008).

Buła, Z., Żaba, J., Habryn, R. (2008): Przegląd Geologiczny, 56: 912-920